
Contents

1	Preparing for Angiography	1
	Preparing the Angiography Equipment Table	1
	Instruments	2
	Medications (with Typical Doses)	2
	Guidewires	3
	Shape	3
	Coating	3
	Sheaths	4
	Catheters	4
	Difference Between Sheaths and Catheters	7
	Setting up Flushes for Sheaths and Catheters	8
	Attaching Flush System to the Sheath	9
	Attaching Flush to the Catheter	11
	Preparation of Patient	11
	Suggested Readings	14
2	Access: Femoral, Radial, Brachial, Carotid	15
	Femoral Access Using Modified Seldinger Technique	15
	Micropuncture Technique	17
	Using Single-Wall 18G Needle	17
	Using Image Guidance in Difficult Access	21
	Radial Access	22
	Allen Test	22
	Reverse Allen's Test	23
	Access Technique	23
	Brachial Access	24
	Carotid Access	24
	Choice of Sheath or Access Device	25
	Problems Encountered and Solutions	25
	Suggested Reading	29

3	Closure Techniques	31
	Manual Compression	31
	Compression Devices	31
	Femostop®	31
	Percutaneous Closure Devices	33
	Angioseal	33
	Cautions	37
	Exoseal	39
	Problems Encountered During Closure and Solutions	42
	Femostop	42
	Angioseal	43
	Suggested Readings	44
4	Contrast Agents	45
	Choices	45
	Adverse Effects	45
	Management of Adverse Reactions	47
	Special Considerations	49
	Diabetes	49
	Diabetes and Renal Insufficiency	49
	Contrast Nephrotoxicity	50
	Prep/Pre-medication for Iodine Allergy	51
	Elective Cases	51
	Emergency Cases	52
	Suggested Readings	52
5	Choice of Sheaths, Wires, and Catheters	53
	Sheaths	53
	Short Sheaths (10–45 cm)	53
	Long Sheaths (90–100 cm)	53
	Special Considerations	55
	Wires	55
	Guide wires	55
	Stiff Wires	56
	Exchange Length Wires	56
	Shaping a Wire	57
	Microguidewires	58
	Catheters	59
	Guide catheters	59
	Diagnostic Catheters	60
	Interventional Catheters/Microcatheters	62
6	Navigation	67
	General Tips	67
	Aortic Arch	67
	Brachiocephalic Trunk	70

Subclavian Artery	70
Vertebral Arteries	71
Right Common Carotid	71
Left Common Carotid	72
Internal Carotid Artery	73
External Carotid Artery	73
Selective Cerebral Artery Catheterization	74
Anterior Cerebral Artery	74
Middle Cerebral Artery	75
Vertebrobasilar System	75
Techniques in Case of Difficult Navigation	76
Postoperative Management and Follow-Up	77
Venography	77
Access	77
Navigation	78
Vessel Selection	78
Techniques in Case of Difficult Navigation	78
Sigmoid Sinus	78
Spinal Angiography	78
Suggested Reading	79
7 Venography and Intervention	81
Equipment	81
Access	81
Navigation	82
Vessel Selection	82
Intervention	82
Cranial Sinus Thrombosis	83
Chemical Thrombolysis	83
Mechanical Thrombectomy	83
Dural Arteriovenous Malformations/Fistulae	84
Closure	84
Techniques in Case of Difficult Navigation	84
Sigmoid Sinus	84
Suggested Reading	85
8 Spinal Angiography and Intervention	87
Spinal Angiography	87
Indications and Case Selection	87
Contraindications	87
Preoperative Management	87
Technique	88
Postoperative Management and Follow-up	91
Spinal Interventional Procedures	92

Indications and Case Selection	92
Contraindications.	92
Preoperative Management	92
Technique	93
Postoperative Management and Follow-up	93
Spinal Fistulae.	94
Indications and Case Selection	94
Contraindications.	94
Preoperative Management	95
Technique	95
Embolic Agents.	95
Postoperative Management and Follow-up	99
Spinal Tumors.	99
Indications and Case Selection	99
Contraindications.	99
Preoperative Management	99
Technique	99
Embolic Agents.	100
Postoperative Management and Follow-up	102
Location Specific Considerations Including Difficult Access.	102
Suggested Readings.	104
9 Embolization for Epistaxis and Cranial Tumors.	105
Epistaxis	105
Indications and Case Selection	105
Preoperative Management	105
Equipment.	106
Vascular Access	106
Procedure	108
Particle Embolization	108
Location-Specific Considerations.	110
Postoperative Management and Follow-up	110
Onyx.	111
Tumors	114
Indications and Case Selection	114
Contraindications.	114
Preoperative Management and Procedure	114
Postoperative Management and Follow-up	115
10 Extracranial Angioplasty and Stenting	117
Subclavian Artery Angioplasty and Stenting	117
Indications and Case Selection	117
Contraindications.	117
Preoperative Management	117

Drugs	118
Devices	118
Vascular Access	119
Intervention	119
Vessel Perforation or Arteriovenous Fistula	121
Indications and Case Selection	121
Preoperative Management	122
Drugs	122
Devices	122
Vascular Access	123
Intervention	123
Problems Encountered and Solutions.	126
Carotid Artery Angioplasty and Stenting.	126
Indications and Case Selection	126
Contraindications.	126
Preoperative Management	127
Carotid Stenosis	127
Drugs	127
Devices	127
Vascular Access	128
Intervention	129
Postoperative Management and Follow-up	144
Alternative Balloon Dilation Catheters	145
Carotid Dissection/Pseudoaneurysm	145
Suggested Readings.	149
11 Intracranial Angioplasty and Stenting.	151
Indications and Case Selection	151
Contraindications.	151
Preoperative Management	151
Angioplasty and Stenting	152
Equipment.	152
Technique	153
Problems Encountered During Angioplasty and Solutions.	159
Problems Encountered During Stenting and Solutions.	160
Indication and Choice of Balloons and Stents.	162
Postoperative Management and Follow-up	163
Suggested Reading	164
12 Treatment of Aneurysms	165
Location-Specific Considerations.	165
Anterior Communicating Aneurysm	165
Posterior Communicating Aneurysm	165
Some Current Choices of Coils and Indications	165
Coil Embolization	167

Indications and Case Selection	167
Preoperative Management	167
Equipment	168
Technique	168
Retrieving and Storing a Deployed Bare Platinum Coil	175
Problems Encountered During Coiling and Solutions	176
Stent-Assisted Coiling	177
Indications	177
Contraindications	179
Additional Equipment	180
Technique	180
Fusiform Aneurysms	183
Other Stents	183
Postoperative Management and Follow-up	184
Problems Encountered During Enterprise Stent Deployment and Solutions	184
Balloon-Assisted Coiling	184
Additional Equipment Needed	185
Indications	186
Technique	186
Problems Encountered During Balloon-Assisted Coiling and Solutions	188
Pipeline® Embolization Device (PED)	189
Indications and Case Selection	189
Contraindications	189
Preoperative Management	189
Equipment	190
Technique	194
Postoperative Management and Follow-up	197
Problems Encountered During PED Deployment and Solutions	198
Location-Specific Considerations	199
Suggested Readings	200
13 Vasospasm	201
Indications for Treatment and Case Selection	201
Preoperative Management	201
Technique	202
Selective Intra-arterial Pharmacological Intervention	203
Verapamil	203
Nicardipine	204
Papavarine	204
Nitroglycerine	205
Angioplasty	205
Devices	205

Deployment	208
Angioplasty	208
Postoperative Management and Follow Up	211
Suggested Reading	211
14 Vascular Malformations	213
Arteriovenous Malformations (AVM)	213
Indications and Case Selection	213
Contraindications.	213
Preoperative Management	214
Technique	214
Double-Injection Technique	219
Postoperative Management and Follow-up	227
Dural Arteriovenous Fistulae (DAVF).	228
Indications and Case Selection	228
Contraindications.	229
Preoperative Management	229
Technique	229
Postoperative Management and Follow-up	234
Carotid Cavernous Fistulae (CCF).	234
Indications and Case Selection	234
Preoperative Management	235
Technique	235
Transarterial Embolization of CCF	236
Transvenous Embolization of CCF	238
Embolization via Superior Ophthalmic Vein	242
Postoperative Management and Follow-up	242
Problems Encountered During Onyx Administration and Solutions.	243
Problems Encountered During NBCA Administration and Solutions	245
Problems Encountered During PVA Administration and Solutions	245
Problems Encountered During Coil Embolization and Solutions.	246
Suggested Readings.	246
15 Stroke.	247
Indications and Case Selection	247
Contraindications.	247
Preoperative Management	248
Chemical Recanalization	249
Abciximab.	249
Technique	250
Mechanical Recanalization	251
Indications and Case Selection	251
Contraindications.	251
Equipment.	251

Technique	254
Thrombolysis	258
Thrombectomy	259
Thrombectomy with Stentriever	263
Problems Encountered During Stentriever Usage and Solutions	264
Problems Encountered During Merci Device Usage and Solutions	268
Problems Encountered During Using of Penumbra System and Solutions	269
Combining Stentriever and Penumbra Systems for Clot Extraction	276
Postoperative Management and Follow-up	283
Problems Encountered During Angioplasty and Stenting and Solutions	284
Pronto Device (for Cranial Sinus Thrombosis)	284
Postoperative Management and Follow-up	288
Problems Encountered During Pronto Device Usage and Solutions	289
Suggested Readings.	289
16 Kyphoplasty	291
Indications and Case Selection	291
Contraindications.	291
Preoperative Management	291
Equipment.	292
Technique	292
Postoperative Orders	296
Suggested Reading	296
17 Neurophysiological Tests.	297
WADA Test	297
Indications.	297
Preoperative Orders.	297
Equipment.	297
Procedure	298
Postoperative Orders	300
Suggested Reading	300
18 Pharmacological Agents	301
Heparin	301
Mechanism	301
Indications and Case Selection	301
Side Effects	301
Dose	301
Major Complications.	303
Contraindications.	303

Reversal	303
Abciximab (ReoPro [®])	304
Mechanism	304
Indications and Case Selection	304
Dose	304
Side Effects	304
Major Complications	304
Contraindications	305
Reversal	305
Aspirin (ASA)	305
Mechanism	305
Indications and Case Selection	305
Dose	306
Side Effects	306
Major Complications	306
Contraindications	306
Reversal	306
Clopidogrel (Plavix [™])	307
Mechanism	307
Indications and Case Selection	307
Dose	307
Side Effects	307
Major Complications	307
Contraindications	308
Reversal	308
Ticlopidine	308
Mechanism	308
Indications and Case Selection	308
Dose	308
Side Effects	308
Major Complications	308
Contraindications	309
Reversal	309
Tissue Plasminogen Activator (TPA)	309
Mechanism	309
Indications and Case Selection	309
Dose	309
Side Effects	310
Major Complications	310
Contraindications	310
Reversal	311
Coumadin	311
Mechanism	311
Indications and Case Selection	311

Dose	311
Side Effects	312
Major Complications	312
Contraindications	312
Reversal	312
Verapamil	312
Mechanism	312
Indications and Case Selection	313
Dose	313
Side Effects	313
Major Complications	313
Contraindications	313
Papaverine	313
Mechanism	313
Indications and Case Selection	314
Dose	314
Side Effects	314
Major Complications	314
Contraindications	315
Nicardipine	315
Mechanism	315
Indications and Case Selection	315
Dose	315
Side Effects	315
Major Complications	315
Contraindications	316
Nitroglycerine	316
Mechanism	316
Indications and Case Selection	316
Dose	316
Side Effects	316
Major Complications	316
Contraindications	316
Fresh Frozen Plasma	317
Mechanism	317
Indications and Case Selection	317
Dose	317
Side Effects	317
Major Complications	317
Contraindications	317
Platelets	318
Mechanism	318
Indications and Case Selection	318
Dose	318

Side Effects	318
Major Complications	319
Contraindications	319
Sodium Amytal	319
Mechanism	319
Indications and Case Selection	319
Dose	319
Side Effects	320
Major Complications	320
Contraindications	320
Xylocaine	320
Mechanism	320
Indications and Case Selection	320
Dose	321
Side Effects	321
Major Complications	321
Contraindications	321
Reversal	322
Suggested Readings	323
19 Complications, Avoidance and Management	325
Cerebral Artery Rupture During Procedure	325
Prevention	325
What to Do Once It Has Occurred	325
Displacement/Embolization of Detached Coil from Aneurysm	327
Prevention	327
What to Do Once It Has Occurred	328
Aneurysm Rupture	334
Prevention	334
What to Do Once Rupture Has Occurred	336
Femoral Pseudoaneurysm	336
Prevention	336
What to Do Once It Has Occurred	337
Thromboembolic Complications	338
Prevention	338
What to Do Once It Has Occurred	338
Dissection	340
Prevention	340
What to Do Once It Has Occurred	340
ICH	341
Prevention	341
What to Do Once It Has Occurred	342
Retroperitoneal Hematoma	342
Prevention	342
What to Do Once It Has Occurred	342

Radial Artery Thrombosis	343
Prevention	343
What to Do Once It Has Occurred	343
Device Failure	343
Stretched Coil	343
Stent Deployment Failure	343
Errant Placement of Stent	344
Merci Device Fracture	344
What to Do Once It Has Occurred	344
Index	345

Handbook of Neuroendovascular Techniques

Khan, S.-N.H.; Ringer, A.J.

2017, XX, 354 p. 77 illus., 26 illus. in color., Softcover

ISBN: 978-3-319-52934-9